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TO : The Files - RD-125, Task Order 15

DATE: 5 January 1960

FROM [REDACTED]

DOC	6	REV DATE	010580	BY	010956
ORIG COMP	033	ORI	526	TYPE	02
ORIG CLASS	5	PAGES	2	REV CLASS	C
JUST	22	NSMT REV	2010	AUTH	DD 16-2

SUBJECT: Trip Report - Photogalvanic Cell Research [REDACTED]

1. On 10 December 1959 a trip was made to [REDACTED] to monitor progress of the photogalvanic cell research being done under Contract RD-125, Task Order 15. Present for discussions were:

2. A typical photogalvanic cell consists of a platinum plate and a silver plate in a solution of hydrochloric acid and ferric chloride. During discharge the ferric chloride decomposes to ferrous chloride and free ions. The remaining chloride reacts with the silver to make silver chloride while the battery discharges. In charging the battery, by radiation from a light source, the silver chloride is decomposed back into silver and the chlorine goes back into ferric chloride. [REDACTED] has been experimenting with various deviations of this method by using halides on the silver such as bromide, chloride, or iodide. Also, cupric chloride has been used in place of ferric chloride in some applications. The best current density to date that [REDACTED] has obtained is 200 microamps per square centimeter with an open circuit voltage per cell of approximately .9 of a volt, and a usable load voltage of approximately .5 of a volt. [REDACTED] said he hoped to increase this current density by a figure of about 10 in the next six months.

3. This light rechargeable battery has the advantage that it can be recharged by simple exposure to light. However, the battery cannot have a form factor such as normal batteries usually have. That is, each individual cell must be exposed to light for recharging so cell stacking cannot be obtained as is done in conventional batteries. This means a considerable area must be exposed to sunlight or other radiation before the battery can be charged. The battery can, of course, be assembled for discharge and then disassembled and spread out over an area for charging.

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4. In addition to this work on the photogalvanic cell, has recently started research work in the fuel cell. To date they have obtained current densities of approximately 6 amps per square *inch* ~~centimeter~~ with aluminum and carbon air electrodes in a concentrated solution of potassium hydrogen. During discharge of this battery the aluminum plate is consumed; however, the plate could be replaced and the battery could be used again. will naturally be going to Government agencies to try and get support for this battery development.

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